Space Weather Forecast

Issued on Tuesday, 29 March 2022 at 13:30 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Chance of further Moderate-class flares throughout. Slight chance of further S1 or above radiation storms. G1-G2/Minor-Moderate geomagnetic storms expected on Day 3 (31 March), with a Chance of G3/Strong Storm.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Moderate, with further minor Moderate-class flares over the past 24 hours, originating from active region 2975.

There are currently seven sunspot regions on the visible disc. AR2975 remains magnetically complex and continues to develop, with further growth in its intermediate spots, and the presence of two delta spots. AR2978 is a large, elongated bi-polar group and continues to rotate from the SE limb and is showing minor trailer spot emergence. AR2976 in the northeast quadrant is currently the largest sunspot, although its delta spot in its leading spot as faded. AR2977 (NW quadrant) and AR2979 (SE quadrant), are now both classified as small bi-polar groups, and have shown signs of decay. AR2974 (SW quadrant) remains a simple and stable uni-polar spot. Newly numbered AR2980 is currently a small bi-polar group in the northwest quadrant.

An Earth directed coronal mass ejection (CME) associated with yesterday's (28 March) moderate-class flare, has been analysed and modelled, which shows an arrival at Earth on Day 3 (31 March). A further CME followed an minor moderate-class flare (also from 2975) around 28/1920UTC, which has also been analysed, and these show a combined CME arriving at Earth on Day 3 (31 March).

Solar Wind / Geomagnetic Activity: The solar wind declined from peaks of around 520km/s to around 410km/s.The strength of the Interplanetary Magnetic Field has been at weak levels, with the north-south component showing weak fluctuations. Geomagnetic activity was Quiet (Kp 1-2).

Energetic Particles / Solar Radiation: The high energy proton flux (10MeV) measured at GOES-16 became enhanced soon after the M4 flare with an S1/Minor radiation storm, which peaked at 18pfu at 28/1450UTC, before dropping below the S1 threshold (10pfu) after 28/2115UTC.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is expected to be mostly Low, but with a chance of further Moderate-class flares, and perhaps a slight chance of an isolated Strong-class flare. This risk mainly from region 2975.

Solar Wind / Geomagnetic Activity: The next enhancement to the solar wind is expected to come from the 28th March CME arrival which is likely to be on Day 3 (31st March), although model results are still pending so this may be adjusted.

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Quiet to Unsettled conditions are expected until Day 3 (31st Mar), when Active to G1-G2/Minor-Moderate storm periods are likely. Disturbed geomagnetic conditions are expected to continue into Day 4 (1st April).

Energetic Particles / Solar Radiation: The continued activity of 2975 in particular gives the slight chance of further potential enhancements above the S1 threshold during the period, particularly on Day 1 (29th) as proton flux levels are still recovering from the S1 event.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	1	80	60
Strong	G3	No	1	1	30	30
Severe	G4	No	1	1	10	10
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	60	60	60	60
Very Active	R3 to R5 X	No	15	15	15	15

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	Yes	20	10	10	10
Very Active	≥ S3 *	No	1	1	1	1

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Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	Yes	20	10	10	10
Very Active	**≥ S3 ***	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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